

**RIVERTON DOME GAS EXPLORATION AND  
STIMULATION TECHNOLOGY DEMONSTRATION,  
WIND RIVER BASIN, WYOMING**

**D.O.E. Contract No. DE-FC26-97FT34181--03**

Contract Starting Date:                      October 1, 1997  
Contract Ending Date:                      March 31, 1999

D.O.E. Award for the Current Year: \$1,197,989

**3rd Quarterly, First Year, Technical Progress Report**

Reporting Period : April 1, 1998 -- June 30, 1998

Ronald C. Surdam  
Project Manager & Principal Investigator

Department of Energy Contracting Officer: Ms. Mary Beth Pearse

August 28, 1998

Institute for Energy Research  
Ronald C. Surdam, Director  
University of Wyoming  
Laramie, Wyoming

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Contractor Name and Address: Institute for Energy Research  
University of Wyoming, P.O. Box 4068  
Laramie, Wyoming 82071

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Project Managers & Principal Investigators: Ronald C. Surdam & Thomas L. Dunn

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## **Objectives**

This project will provide a full demonstration of an entirely new package of exploration technologies that will result in the discovery and development of significant new gas reserves now trapped in unconventional low-permeability reservoirs. This demonstration includes the field application of these technologies, prospect definition and well siting, and a test of this new strategy through wildcat drilling. In addition this project includes a demonstration of a new stimulation technology that will improve completion success in these unconventional low permeability reservoirs which are sensitive to drilling and completion damage. The work includes two test wells to be drilled by Snyder Oil Company on the Shoshone/Arapahoe Tribal Lands in the Wind River Basin. This basin is a foreland basin whose petroleum systems include Paleozoic and Cretaceous source beds and reservoirs which were buried, folded by Laramide compressional folding, and subsequently uplifted asymmetrically. The anomalous pressure boundary is also asymmetric, following differential uplift trends.

## **Scope of the Work**

The Institute for Energy Research has taken a unique approach to building a new exploration strategy for low-permeability gas accumulations in basins characterized by anomalously pressured, compartmentalized gas accumulations. Key to this approach is the determination and three-dimensional evaluation of the pressure boundary between normal and anomalous pressure regimes, and the detection and delineation of areas of enhanced storage capacity and deliverability below this boundary. This new exploration strategy will be demonstrated in the Riverton Dome—Emigrant Demonstration Project (RDEDP) by completing the following tasks: 1) detect and delineate the anomalous pressure boundaries, 2) delineate surface lineaments, fracture and fault distribution, spacing, and orientation through remote sensing investigations, 3) characterize the internal structure of the anomalous pressured volume in the RDEDP and determine the scale of compartmentalization using produced water chemistry, 4) define the prospects and well locations as a result on this new exploration technology, and 5) utilize new completion techniques that will minimize formation damage and optimize production.

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# **Summary of Technical Progress**

## **Task 1. Detect and Delineate the Anomalous Pressure Boundaries Using Analysis of 2D & 3D Seismic Data and Sonic Log Velocity Analysis**

Processing of the Riverton Dome and Emigrant 3-D volumes took place during this period. While it was expected that processing would be completed before the end of this quarter, delays at the processing company have pushed the actual receipt of the Riverton Dome 3-D data to the beginning of the fourth quarter. Initial viewing suggests the data quality is good and that there will be little trouble initiating our analyses when the time comes.

We have completed a regional study of sonic velocities in the western Wind River Basin. Riverton Dome fits nicely into the updip southern margin of the anomalously pressured section in the basin. Although the sonic log data within the Riverton Dome 3-D seismic area are sparse, it appears as if the southern boundary of the anomalously pressured section cuts through the middle of the Riverton Dome study area. Thus, our seismic and sonic velocity analyses should be very useful in delineating anomalously pressured hydrocarbon plays.

## **Task 2. Delineate Surface Fracture and Fault Distribution, Spacing, and Orientation Lineaments Through Remote Sensing Analysis**

Preliminary work has demonstrated that there are several significant east-west regional linears characterizing the structural setting to the north of the 3-D seismic study area.

## **Task 3. Characterization of the Internal Structure of the Anomalous Pressured Volume in the RDEDP & Determination of Compartmentalization Using Produced Water Chemistry and Petrography**

Cores from five wells in the Riverton Dome area were examined: Riverton Dome Tribal #2, Tribal #8, Tribal #9, and M.B. O'Connor 31. Tribal #2 was sandstone in the 11,534-12,072 depth interval, siltstone in the 11,489-11,510 depth intervals, and limestone in the 11,424-11,458 depth interval. Tribal #6, in the 9580-9605 depth interval, consisted of sandstone and conglomerates. Tribal #8 in the 9612-9631 depth interval was composed of sandstone and sandy limestone. Tribal #9 was composed of sandstone, siltstone, and shale in the 8371-9015 depth interval. M.B. O'Connor #1 was composed of sandstone, silty sandstone, calcite-cemented sandstone, and shale for the 7956-8759 depth interval.

## **Task 4. Play and Prospect Definition and Wildcat Wells Location Determination: New Exploration Technology Demonstration**

This portion of the study is of course contingent upon the above mentioned progress.

## **Task 5. Well Demonstrations: Exploration Technology and New Stimulation**

This portion of the study is of course contingent upon the above mentioned progress and is scheduled for the latter portion of the study.

## **Task 6. Project Integration and Technology Transfer: Workshops, Briefings and Publications**

John Robinson has left Snyder Oil and been replaced by Steve Siguaw. Thomas L. Dunn has left IER; his duties under this contract have been assumed by Ronald C. Surdam. The third quarter has been spent working out problems with these personnel changes and establishing new lines of communication. Snyder Oil Company continues to provide weekly E-mail progress updates to the DOE and IER.